

Sonoma Valley Monitoring Work Group

Monitoring Program Framework

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Introduction

Foundational to the GMP is a monitoring program capable of assessing the status and trends of the groundwater levels and quality of the basin, and responses in the basin to future management actions. The program includes the monitoring of groundwater elevations, monitoring of groundwater quality, monitoring and assessing the potential for land surface subsidence resulting from groundwater extraction. Establishment of monitoring protocols to ensure the accuracy and consistency of data collected is also of high importance. Additionally, the monitoring program includes a GIS and data management system, for assembling and assessing the groundwater-related data in the Sonoma Valley Groundwater Basin.

A groundwater monitoring program is a long-term, systematic effort to provide essential data needed to evaluate changes in the resource over time, for groundwater modeling and to forecast trends, and to design, implement and monitor the effectiveness of groundwater management and protection programs. It is an investment of time and resources in the sustainability of the groundwater system. Technical staff and the Basin Advisory Panel have made decisions about the number and locations of monitoring wells in the program to include data representative of various topographic, geologic, climatic, and land use environments, as well as complexity and physical boundaries of aquifers. Collecting data from all wells in the basin is neither necessary nor feasible; however, sufficient monitoring information needs to be collected throughout the region or distributed geographically across the Valley and at various depths to understand and measure changes in the groundwater system due to the effects of pumping, land use change, or natural, climatic-induced hydrologic stresses.

Purpose: The purpose of the monitoring program is to provide information for assessing the status of the basin including trends in groundwater elevations and quality, and to predict responses of the basin to future management actions.

Objectives of the Monitoring Program include:

- Develop and maintain adequate information to assess the status of the basin, trends in groundwater elevations and quality, and response to future management actions
- Provide sufficient groundwater quality data to assess status and trends of groundwater quality for the beneficial uses of water in the basin
- Establish monitoring protocols to ensure the adequacy and consistency of data collected, and a framework and format for data collection and maintenance

Groundwater Management Plan (GMP) requirements under Water Code section 10753.7(4): the local agency shall adopt monitoring protocol that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by

groundwater pumping in the basin. The monitoring protocols shall be designed to generate information that promotes efficient and effective groundwater management.

Current State of the Basin

Several areas within the basin have been identified by stakeholders as being issues of concern. These issues may need to be prioritized for focused monitoring efforts:

- Adobe Canyon/Kenwood area – recharge and high groundwater levels
- Northwest Glen Ellen area – anomalous groundwater levels
- Thermal-Warm Springs Canyon area – high mineral/total dissolved solids in groundwater
- Thermal-Boyes/Fetter Springs area – high mineral/total dissolved solids in groundwater
- Carriger Creek/Diamond A area – recharge area on alluvial fan and groundwater depression
- Southeast of Sonoma – groundwater depression
- Southern Valley - saline intrusion area

Evaluating current monitoring wells available, groundwater levels and water quality data suggest that the southern portion of the Sonoma Valley, just north of the City of Sonoma south to the Schellville, is the area of the Sonoma Valley groundwater basin with the most complexity and highest level of uncertainty in terms of monitoring data. This area contains high capacity public supply wells, two groundwater depression areas, and complex water level contours. (Water level contours are lines that reflect the shape and slope of the groundwater table surface, much like a topographic map of the ground surface.) This is also the most highly urbanized portion of the basin. The Basin Advisory Panel recommends that this area be considered the highest priority area for additional monitoring efforts and resources.

Groundwater Elevation Monitoring

Historic water level data measurements have been compiled from 1950 to 2006. Sources of historic water level data for the Sonoma Valley include:

- DWR has compiled since the early 1970's; currently 9 private supply wells monitored of 20 private supply wells totally available and monitored historically
- Valley of the Moon (VoM) since 1996 for five public supply wells, and in 1999 initiated a supplemental monitoring program to include three VOM monitoring wells, two Sonoma County park wells, and an additional 24 private supply wells with the last well added in 2003
- City of Sonoma (CoS) since 1998 for six public supply wells, since 2004 for a seventh public supply well, and since 1999 added 5 private supply wells

DWR, VoM, CoS, and Sonoma Ecology Center (SEC)(?) have maintained a program of measuring water levels in more than 60 wells in the basin, as outlined above. Of these 60 wells, all except for three are production/supply wells being monitored. Only three are

wells constructed for the purpose of collecting data. However, some of the DWR wells have been dropped off of the network over time, and the data distribution vary over the long term and spatially so it is difficult to compare historic and recent water level plots. There is currently inadequate groundwater level monitoring to assess trends and the status of some areas of the alluvial groundwater basin, and there is little or no data being collected on bedrock wells.

Actions. The BAP recommends the following actions be taken in the Sonoma Valley:

- 1) Coordinate the efforts of, VoM, CoS, SEC(?), SCWA, DWR and volunteer efforts to select an appropriate group of wells for a fall 2007 set of groundwater elevation measurements
- 2) Using the wells selected for fall 2007 monitoring, establish a standardized, long-term monitoring network that combines existing, long term historic monitoring of public supply and private wells by DWR, VoM, CoS, and SEC(?) volunteer monitoring currently being conducted by private parties, and in the future additional volunteer wells and new wells to:
 - a. Work to provide an average minimum aerial/geographical distribution of one well per five square miles density with reasonably uniform geographic coverage, with higher localized density in areas where groundwater levels or quality trends are of concern or anomalous
 - b. Work to provide depth discrete monitoring taking into account the local hydrogeologic complexity and aquifer geometry
 - c. Collect groundwater elevations on a minimum of a biannual basis (spring and fall), and prioritize specific areas where more frequent groundwater elevation monitoring may be desirable, for example in recharge areas and along water courses
- 3) Coordinate with DWR to try to recapture previously monitored wells into the monitoring program.
- 4) Coordinate with VoM, CoS, DWR and volunteer efforts to ensure that the selected wells in a standardized network are continually maintained as part of a long-term monitoring network.
- 5) Coordinate with other local and state agencies to identify where wells may exist in areas with sparse groundwater level data. Identify opportunities for collecting groundwater levels from those wells.
- 6) Facilitate and encourage an expanded volunteer groundwater level monitoring network through public outreach to increase the density of aerial and depth distribution to understand groundwater level trends in the basin and in bedrock areas of the Sonoma Valley area. The outreach will include a letter and fact sheet describing:
 - a. The need for the data.
 - b. How the data are collected.
 - c. How the data will be used.
 - d. How data will be maintained confidentially.
- 7) Identify locations for new multi-depth monitoring wells and outside funding such as state grants. Incorporate any new wells into the long-term monitoring program,

- 8) Coordinate with local, state and federal agencies to develop partnerships and investigate opportunities to develop better information on groundwater level monitoring.
- 9) Assess groundwater elevations on annual basis including trends, conditions and adequacy of monitoring network as part of an annual state of the basin under the GMP

Groundwater Quality Monitoring

Current monitoring for water quality information is primarily available from public water supply wells being monitored by VoM and CoS, and historic, long term water quality monitoring by DWR. Because most of the VoM and CoS wells in the basin are used for public water supply, an extensive record of water quality data is available for these wells. This level of monitoring is sufficient for these wells under existing regulatory guidelines to ensure that the public is provided with a safe, reliable drinking water supply. In addition, many tasting rooms in the Sonoma Valley monitor water quality used for public consumption in these businesses. The following monitoring is being conducted by VoM, CoS, and DWR:

- VoM for five public supply wells monitored as required by California Department of Health under CCR Title 22
- CoS for seven public supply wells monitored as required by California Department of Health Services under CCR Title 22.
- DWR for various private wells, water quality parameters including major ions (including calcium, magnesium, potassium, sodium, carbonate, bicarbonate, chloride and sulfate), iron, manganese, boron, nitrate, total dissolved solids, total alkalinity, specific conductance (referred to as either specific conductance [USGS] or electrical conductance (CADWR)), pH, and water temperature.

The Sonoma Valley was sampled one-time for volatile organic compounds, pesticides, waste-water indicators, trace elements, major and minor ions, isotopic constituents and noble gases, nutrients and other water quality indicators under the California Groundwater Ambient Monitoring and Assessment (GAMA) Program for the North San Francisco Bay Hydrologic Provinces in 2004. Results of the sampling were reported in the U.S. Geological Survey Data Series 167 in 2006. Results of the sampling and analyses indicate all constituents were well under the regulatory thresholds, and only traces of nutrients and waste-water indicators in a few of the wells sampled in the Sonoma Valley (meaning below any health threshold of concern). An interpretive report is due out later this year on the GAMA results for the North San Francisco Bay Hydrologic Region.

Actions. The BAP recommends the following actions be taken in the Sonoma Valley:

- 1) Coordination to ensure uniform protocols are being followed for water quality data collection.

- 2) Coordinate with other local and state agencies to identify where wells may exist in areas with sparse groundwater quality data. Identify opportunities for collecting and analyzing water quality samples from those wells.
- 3) Coordinate with DWR to try to recapture previously monitored wells into the monitoring program.
- 4) Coordinate with local, state and federal agencies to develop partnerships and investigate opportunities to develop better information on groundwater quality monitoring.
- 5) Review the GAMA interpretive report when it becomes available and evaluate whether additional water quality monitoring for constituents not currently being monitored in the Sonoma Valley is needed.
- 6) Assess water quality trends, conditions and adequacy of monitoring network annually.
- 7) Coordination on water data quality collection to further meet Sonoma Valley groundwater basin stakeholder potential needs.

Inelastic Land Surface Subsidence

Available data and reports indicate that inelastic land surface subsidence due to groundwater extraction is not considered a potential problem in the Sonoma Valley area. Research of available evidence of inelastic land subsidence due to groundwater extraction in the Sonoma Valley area was completed by communicating with local and state agencies and organizations and no evidence of inelastic land subsidence due to groundwater extraction in the Sonoma Valley area was found. SCWA conducted a leveling survey of the Valley at three benchmarks in the Sonoma Valley, compared the survey results to historical survey measurements, and no significant difference in elevation was measured.

Actions. The BAP is interested in pursuing additional possible actions to continue to monitor for potential land surface subsidence. These may include:

- 1) SCWA is coordinating with USGS to ascertain the suitability of the use of Interferometric Synthetic Aperture Radar (InSAR) images of the Sonoma Valley for assessing potential changes in ground elevation over the last one to two decades. If the technology appears suitable, the cost would be estimated and also potential cost-sharing partners would be identified to further consider the economics and priority of using this technology.
- 2) Coordinate with VoM and CoS to determine if there are other suitable benchmark locations in the Sonoma Valley to aid in the analysis of potential land subsidence.

Surface Water-Groundwater Interaction Monitoring

The interaction between surface water and groundwater has not been adequately evaluated in the Sonoma Valley area. There is not adequate stream gaging, and it is not well understood what the effects of surface water and groundwater are on the quality and quantity of each. Results of seepage runs conducted by the U.S. Geological Survey

indicated that Sonoma Creek is generally a gaining watercourse (groundwater is adding flow to the watercourse) between where Sonoma Creek crosses Highway 12 and Schellville, and is a losing watercourse (the watercourse loses flow to groundwater) where Sonoma Creek flows across the alluvial fan between the mountain front and Highway 12. Results of groundwater model flow simulation by the U.S. Geological Survey also indicate that the Sonoma Creek is generally a losing watercourse.

Actions. Additional actions recommended by the BAP include:

- 1) Include one additional stream gage for the Sonoma Valley, in the Kenwood area
- 2) Continue to compile available stream gage data and information on tributary flows and diversions from the Sonoma Creek area. Once the additional stream gage is installed, quantify net groundwater recharge or discharge between gages.
- 3) Correlate groundwater level data from wells in the vicinity of stream gage data to further establish connectivity of the creek and groundwater, and whether the Creek is gaining or losing in these locations.
- 4) Coordinate with local, state and federal agencies to develop partnerships and investigate opportunities to develop better information on surface water-groundwater interaction in the Sonoma Valley, including installation, water level and water quality monitoring of new/additional volunteer shallow wells adjacent to the water courses at several key locations.

Monitoring Protocols

To compare groundwater data on a basin-wide basis in the Sonoma Valley requires consistent data collection techniques, frequencies, documentation methodologies, and good quality assurance practices to help maintain the accuracy and precision of monitoring data.

Actions: To ensure and improve the accuracy, comparability, reliability of groundwater data, the BAP recommends that the following be completed:

- 1) Develop a schedule and coordinate the time of sampling and the sampling interval (time between samples) to ensure data collection frequency.
- 2) Adoption and use of a Standard Operating Procedure (SOP) for the collection of water level data by each of the collecting stakeholders (attached).
- 3) Provide guidelines on the collection of water quality data developed by the California Department of Health Services (DHS) for the collection, pretreatment, storage, and transportation of water samples (attached).
- 4) DWR has specific quality assurance/quality control procedures for groundwater quality sample collection and analysis.
- 5) For individual studies to be conducted in the future in the Sonoma Valley, study-specific quality assurance/quality control procedures for groundwater quality sample collection and analysis will be utilized.
- 6) Develop field and office quality assurance practices for the program including
 - a. Establishment of permanent datums
 - b. Periodic well inspections for defects and hydraulic testing

- c. Standardized recordation of results
 - d. Maintenance of a permanent file of well and monitoring information
- 7) Provide training on the implementation of these SOPs and quality assurance practices to collecting stakeholders as needed.

Data Management System

A geographic information system (GIS) data management system was originally developed by the Sonoma Ecology Center under an agreement with the Sonoma County Water Agency. Subsequently, the US Geological Survey in cooperation with SCWA undertook a study to evaluate the groundwater resources of the Sonoma Valley, which entailed further developing the GIS data management system for the Sonoma Valley. The GIS data management system includes topography, hydrology, geology, land and water use information, surface water quality, groundwater level and quality data, groundwater extraction data, well location and construction details, and other information.

Actions: The BAP recommends the following additional actions be implemented:

- 1) The GIS data management system and the data will need to be housed, maintained and updated continuously and permanently
- 2) Well data, including well drillers logs, completion reports, groundwater level and groundwater quality will be maintained confidential per requirement of California Water Code, Division 7, Chapter 10, Article 3, Section 13752.
- 3) Coordination and development of agreements with DWR, VoM, CoS, SEC, SCWA, and any other data collection efforts to assure continued update of the database
- 4) Coordination and development of standard data formats for data collection, data transfer protocols, data reporting, and quality assurance-quality control checks to facilitate regularly scheduled data updates
- 5) The GIS data management system will be used to assist in the annual evaluation of data and to prepare the annual state of the basin report which will summarize groundwater conditions within the basin and document groundwater management activities conducting in the previous year